

Description

Cutting Device for Workpieces Such as Rods, Bolts and the Like, Especially for Threaded Rods

BACKGROUND OF INVENTION

[0001] 1. Field of the Invention.

[0002] The invention relates to a cutting device for workpieces, for example, rods, bolts and the like, in particular, for threaded bolts. The cutting device comprises two shearing edges movable relative to one another and two actuating levers.

[0003] 2. Description of the Related Art.

[0004] For installing pipelines, in particular, for suspending pipelines, screw-tightened pipe clamps are usually employed that must be positioned by means of threaded rods. Usually, they must be cut to a particular size, sometimes on site. For this purpose, saws, cut-off machines or other special cutting devices are used. When employing

saws and cut-off machines, the cut end of the thread is deformed or a burr is generated so that it is possible only with difficulty to screw a nut onto the threaded rod. In the case of special cutting devices, two actuating levers are used that are provided at their free end with a cutting jaw, respectively, for cutting the threaded rod. In this case, there is also a burr or deformation at the end of the thread that makes screwing of a nut onto the thread significantly more difficult. Moreover, such special cutting devices are relatively large.

SUMMARY OF INVENTION

[0005] It is an object of the present invention to configure a cutting device of the aforementioned kind such that, while it has a compact configuration, a proper cropping or cutting of the workpieces is possible.

[0006] In accordance with the present invention, this is achieved in that the actuating levers are two-arm pivot levers having a first arm configured as an actuating arm (actuator) and a second arm that is provided with the shearing edge, respectively.

[0007] In the cutting device according to the invention, two-arm pivot levers are used for the shearing action. With the first lever arm (actuating arm) the pivot levers are pivoted rela-

tive to one another in the required direction. The second lever arm is provided with the shearing edges for properly separating or cutting the workpiece to the required length. As a result of the two-arm configuration of the pivot levers, the cutting device according to the invention has a compact size. Despite of its compact size, the cutting device is able to perform a clean cut for separating the workpieces.

BRIEF DESCRIPTION OF DRAWINGS

[0008] Fig. 1 is a side view of a cutting device according to the invention.

[0009] Fig. 2 is a section along the line II-II of Fig. 1.

[0010] Fig. 3 is an illustration corresponding to Fig. 1 of two cutting inserts in the initial position.

DETAILED DESCRIPTION

[0011] The cutting device is designed to cut or crop rods, bolts and the like, particularly, however, threaded rods, very precisely to the required length in a simple way. The cutting device is configured such that no burrs and the like are formed in the area that is cut. This is particularly advantageous for cutting threaded rods because as a result of the precise cutting action the thread is not damaged so

that, for example, nuts can be screwed without problem onto the cut-off end of the threaded rod.

[0012] The cutting device has two pivot levers 1, 2 that are pivotably supported by means of bolts 4, 5 between two brackets 3 extending transversely to the pivot levers 1, 2. The bolts 4, 5 connect the brackets 3 with one another and serve as a pivot axis for the two-arm levers 1, 2. The lower actuating arms 6, 7 of the pivot levers 1, 2 illustrated in Fig. 1 are loaded relative to one another by a pressure spring (not illustrated). The pressure spring is positioned in recesses 8, 9 provided in the actuating arms (actuators) 6, 7; the recesses 8,9 extend perpendicularly to the bolts 4, 5. The pressure spring loads the pivot levers 1, 2 such that the upper arms 10, 11 of the pivot lever are loaded in a direction toward one another. In the end position illustrated in Fig. 1, the pivot levers 1, 2 rest with plane end faces 12, 13 areally against one another. At the level of the bolts 4, 5 the end faces 12, 13 pass into slanted surfaces 14, 15 that diverge relative to one another beginning at the end faces 12, 13. The surfaces 14, 15 are positioned at an acute angle 16 relative to one another. This angle 16 determines the maximum pivot travel that can be performed by the two pivot levers 1, 2

when the actuating arms (actuators) 6, 7 are moved in a direction toward one another. As soon as the slanted surfaces 14, 15 contact one another, the maximum pivot travel of the pivot levers 1, 2 is reached.

[0013] The end faces 12, 13 of the actuating arms 6, 7 of the pivot levers 1, 2 can be configured to be stepped (indicated by dashed lines in Fig. 1) so that in the closed position according to Fig. 1 the end faces 12, 13 overlap one another, when viewed in the axial direction of the bolts 4, 5. This overlap becomes effective when the shearing action is carried out. This overlap causes advantageously a support action during the shearing step so that the formation of a burr is reliably prevented during the cutting action.

[0014] The cutting device has two brackets 17 positioned between the actuating arms 6, 7 of the pivot levers 1, 2. The brackets 17 are used to connect the cutting device to a drive device (not illustrated). Such a drive device is known in the art and is therefore not explained in more detail in this connection. Such drive devices are used in connection with presses or pressing tongs and have rolls that are fastened on a movable drive rod. This movable drive rod is movable in the longitudinal direction of the cutting device.

The rolls move on plane slanted surfaces 18, 19 that are provided on facing inner sides of the actuating arms 6, 7 of the pivot levers 1, 2. When the drive rod with the rolls is extended, the pivot levers 1, 2 are pivoted by the rolls such that their end faces 12, 13 come to rest against one another.

[0015] The arms 10, 11 of the pivot levers 1, 2 are provided with a receiving space in the form of a recess 20, 21 that extends from the respective end faces 12, 13 of the arms 10, 11. As illustrated in Fig. 2, the recesses 20, 21 are open in a direction toward the opposite lateral surfaces 22 and 23 of the arms 10, 11. Into the recesses 20, 21 the cutting inserts 24, 25 are inserted that are identical but mirror-symmetrically arranged to one another. The cutting inserts 24, 25 have an opening 26, 27, respectively, for passing fastening screws 28, 29 therethrough. The screws 28, 29 are screwed into the threaded bores 30, 31 provided in the arms 10, 11. The screw heads are recessed within the cutting inserts 24, 25.

[0016] The cutting inserts 24, 25 have a substantially rectangular contour and rest with their longitudinal sides 32, 33 against the longitudinal sides 34, 35 of the corresponding recesses 20, 21. Moreover, the cutting inserts

24, 25 rest areally with a narrow side 36 on the narrow side 37 of the recesses 20, 21. In this way, the forces occurring during the cutting process to be described in the following are reliably transmitted onto the pivot levers 1, 2.

[0017] The cutting inserts 24, 25 project past the end faces 12, 13 of the arms 10, 11 of the pivot levers 1, 2. On these projecting ends a circular section recess 38, 39 is provided that serves as a receptacle for the threaded rod 48 to be separated or cut.

[0018] The two cutting inserts 24, 25 are staggered relative to one another in the direction of the pivot axis such that their cutting edges 41, 42 are positioned in a common shearing plane 43 that extends perpendicularly to the bolts 4, 5 and is positioned in the illustrated embodiment at half the width of the arms 10, 11 of the pivot levers 1, 2.

[0019] The receptacles or recesses 38, 39 extends across the entire thickness of the cutting inserts 24, 25. When threaded rods 40 are to be cut by the cutting device, the recesses 38, 39 of the cutting inserts 24, 25 are provided with a thread that matches the thread of the threaded rod 40 that has to be cut. Therefore, when the threaded rod 40 is

inserted into the cutting device, the thread of the threaded rod 40 and of the recesses 38, 39 engage one another in a positive-locking way.

[0020] In order for the threaded rod 40 to be inserted into the recesses 38, 39 of the cutting inserts 24, 25, the actuating arms 6, 7 of the pivot levers 1, 2 are pressed together. In this way, the arms 10, 11 move away from one another. The cutting inserts 24, 25 are moved correspondingly to such an extent that they have a spacing relative to one another. The threaded rod 40 can then be inserted into one of the two recesses 38, 39. By means of the thread engagement, the threaded rod 40 is axially secured against movement within the recess 38, 39, respectively. When the arms 6, 7 are released, the pivot levers 1, 2 are loaded by means of the pressure spring positioned in the recesses 8, 9 such that the arms 10, 11 together with the cutting inserts 24, 25 are pivoted in a direction toward one another. As soon as the recesses 38, 39 surround the threaded rod 40 to be cut, the pivot movement of the pivot levers 1, 2 is terminated. Since the two recesses 38, 39 are semi-circular in shape, the cutting inserts 24, 25 surround in this initial position the threaded rod 40 about its circumference. The end faces 12, 13 of the arms 10,

11 of the pivot levers 1, 2 are spaced apart from one another in this position.

[0021] Subsequently, by means of the drive device the rod that supports the pressure rolls is extended. The pressure rolls move onto the slanted surfaces 18, 19 of the actuating arms 6, 7 and push them apart. This causes the cutting inserts 24, 25 to move in a direction toward one another. The shearing edges 41, 42 cut the threaded rod 40 in the area of the shearing plane 43 (Fig. 2). The cutting inserts 24, 25 overlap one another in the cutting position according to Fig. 2. The two sections 44, 45 of the threaded rod 40 produced by the cutting process will not drop out of the cutting inserts 24, 25 after the shearing process because the rod sections 44, 45 are secured by the thread engagement with the cutting inserts 24, 25. After the shearing or cutting process, the drive rod with the pressure rolls is retracted by the drive device to such an extent that, for the purpose of removing the threaded rod sections 44, 45, the actuating arms 6, 7 of the pivot levers 1, 2 can be pressed against one another to such an extent that the threaded sections 44, 45 can be removed from the cutting inserts 24, 25.

[0022] Since the recesses 38, 39 of the cutting inserts 24, 25 are

provided with the thread, it is ensured during the shearing process that the threaded rod sections 44, 45 cannot tilt relative to one another but are axially aligned relative to one another. The thread of the recesses 38, 39 and the threaded rods 40 prevent an undesirable pivot movement of the threaded rod sections 44, 45 during the separating process. In this way, the threaded end of the threaded rod section 44, 45 that has been cut off is not deformed and no burr is formed. Directly after the shearing process, it is therefore possible without a problem to screw a nut onto the threaded rod end that has been cut off.

[0023] Since the cutting inserts 24, 25 are actuated by the two-arm pivot levers 1, 2, the cutting device can be configured to be very compact. The two-arm configuration of the pivot levers 1, 2 enables for small pivot angles a satisfactorily large travel for the cutting inserts 24, 25 during the shearing process.

[0024] Depending on the size of the threaded rod 40, different cutting inserts 24, 25 can be attached to the pivot levers 1, 2. The threaded rod 40 can be, for example, of the size M8, M10, and M12. The recesses 38, 39 in the separating or cutting inserts 24, 25 are shaped to match them. Since the cutting inserts 24, 25 are detachably mounted on the

pivot levers 1, 2, they can be exchanged without a problem within a very short period of time.

[0025] The cutting device is embodied in the form of pressing (cropping) tongs used conventionally for pressing fittings for pipe connections. Such pressing tongs have pressing jaws with which the fittings are, for example, plastically deformed in the radial direction. It is possible to attach such pressing jaws detachably on the pivot levers 1, 2 so that the pressing jaws, as needed, can be exchanged simply for cutting inserts 24, 25. The detachable connection can be achieved, aside from screws, by snap-on connections, for example. For driving the pressing jaws and the cutting inserts, the same drive device can be employed. In this way, a tradesman has available a universal device with which, as needed, he can plastically deform fittings for pipe connections or cut threaded rods.

[0026] Instead of threaded rods, the cutting device can also be used, for example, for cutting threaded bolts, rods without a thread, and the like. These parts are inserted such into the recesses 38, 39 of the cutting inserts 24, 25 that they can be cut to the desired length by means of the shearing edges 41, 42.

[0027] While specific embodiments of the invention have been

shown and described in detail to illustrate the inventive principles, it will be understood that the invention may be embodied otherwise without departing from such principles.